



# High Power Microwave Narrowband Threat Systems



## HPM NBTS Capability Summary

- Provides an HPM source to determine the susceptibility of a system under test to narrowband RF energy
- Transportable and capable of being relocated from one test site to another
- Provides HPM energy in several frequency bands
- Capable of remote and autonomous operation
- Developed by Ktech Corporation of Albuquerque, NM
- HPM NBTS-A available from White Sands Missile Range

## HPM NBTS System Specifications

- Frequency spectrum: 200 MHz-12 GHz
- Power output: 8-100 MW (depending on frequency)
- Pulse length: 10-300 ns (depending on frequency)
- Pulse length variability:  $\pm 5$ -250 ns (depending on frequency)
- Pulse repetition frequency: 10-200 Hz (depending on frequency)
- Bandwidth: <1% center band frequency

The High Power Microwave (HPM) Narrowband Threat Systems (NBTS) Capability is being developed by the Directed Energy Test and Evaluation Capability (DETEC) project. The HPM NBTS provides test ranges with a highly flexible tool to assess weapon system susceptibility over a range of frequencies, varying pulse repetition rates, pulse widths, energy on target, and other parameters of narrowband HPM emission. This capability is being developed in response to several high-priority shortfalls identified by the 2004 DETEC Tri-Service Study, which developed, scoped, and prioritized directed energy (DE) test and evaluation (T&E) infrastructure shortfalls. These shortfalls represent a need for an HPM source to evaluate the susceptibility of US assets to HPM energy when the actual HPM source is not available.

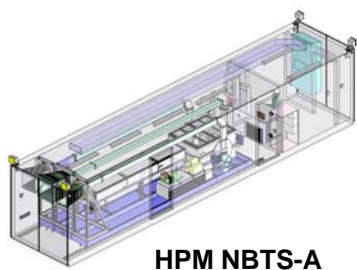
## HPM NBTS Overview

The HPM NBTS Capability provides narrowband HPM emission sources that mimic opposing-force HPM weapons. The capability covers the five frequency bands – ultra high frequency (UHF), L, S, C, and X – and is divided by frequency range into eight subsystems:

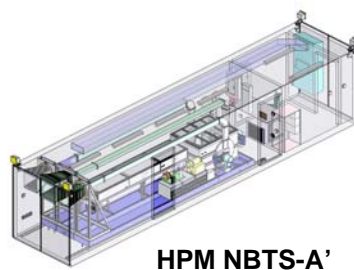
- HPM NBTS-A (L-band)
- HPM NBTS-A' (lower S-band)
- HPM NBTS-B (X band)
- HPM NBTS-C (lower UHF-band)
- HPM NBTS-D (upper S-band)
- HPM NBTS-E (upper UHF-band)
- HPM NBTS-F (lower C-band)
- HPM NBTS-G (upper C-band)

The HPM NBTS Capability is designed to simulate as many scenarios and engagements as possible, maximizing its usefulness to weapon system designers needing to meet rigorous HPM survivability thresholds. The capability consists of power conditioning, radio frequency sources, antenna, controls, and a diagnostic capability. HPM NBTS can be operated during the day or at night.

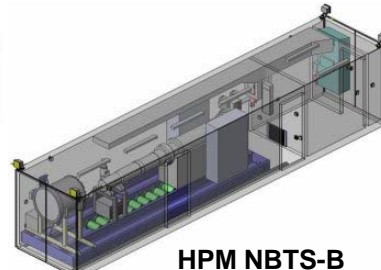
The HPM NBTS Capability is readily transportable, and the time required to package the system from its operational state into a transportable configuration is less than one day. To increase flexibility in testing, each HPM NBTS variant is independently deployable and packaged in a standard ISO container. The transportation system provides shock and vibration isolation to ensure internal systems are undamaged when they arrive at a test site. The HPM NBTS systems' antenna(s), waveguides, and waveguide elbows are installed inside the container. Furthermore, each HPM NBTS system is self-contained with minimal set up and tear down requirements.



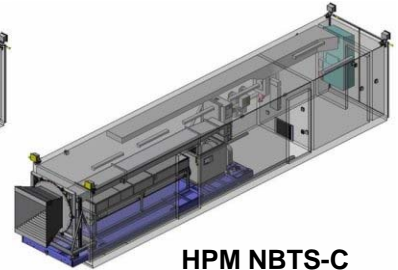
**HPM NBTS-A**



**HPM NBTS-A'**



**HPM NBTS-B**



**HPM NBTS-C**

NBTS System Designation	Radar Band	Center Frequency (GHz)
NBTS-A	L	100% coverage from 1.0-1.7 GHz
NBTS-A'	S-Lower	100% coverage from 1.7-2.66 GHz
NBTS-B	X	10.0 ± 10%
NBTS-C	UHF-Lower	0.425 ± 10%
NBTS-D*	S-Upper	Within 2.66-4.0
NBTS-E*	UHF-Upper	Within 0.75-1.0
NBTS-F*	C-Lower	Within 4.0-6.0
NBTS-G*	C-Upper	Within 6.0-8.0

\* System will not be pursued in current DETEC project

DETEC's first priority is to build HPM NBTS-A and C, followed by HPM NBTS-A' and B. Due to budget constraints and DETEC's period of performance, DETEC will not build HPM NBTS-D, E, F, and G in the near future.

## Operational Description

The HPM NBTS Capability supports HPM susceptibility testing by providing the following functions:

- Emulates threat systems by providing a wide range of adjustability of performance parameters
- Supports multiple users at different testing locations due to each subsystem's modular, independent systems
- Enhances safety by providing operating procedures commonality across all subsystems

## Program Status

The DETEC Systems Integration Contractor (SIC) manages the HPM NBTS Capability development projects. The DETEC SIC competitively awarded the HPM NBTS-A, A', B and C Subsystem development contracts to K-Tech Corporation of Albuquerque, NM on 12 January 2007 (HPM NBTS-A and A') and 28 September 2007 (HPM NBTS-B and C). The first NBTS subsystem, HPM NBTS-A, was completed in April 2009 and is available for use from White Sands Missile Range. HPM NBTS-A' and HPM NBTS-C will be fielded in fall 2009, with HPM NBTS-B due in late 2009.

## HPM NBTS Capability Integrated Product Team

To guide the development process, DETEC formed the HPM NBTS Capability Integrated Product Team (IPT) with representatives from the Major Range and Test Facility Base (MRTFB), the military Services, and the HPM community.

The HPM NBTS IPT represents the future users of the HPM NBTS Capability. The DETEC SIC structured the HPM NBTS development to engage the IPT members to actively participate in the development effort by providing guidance and expert advice. The HPM NBTS IPT members also participate in key reviews at significant points during design, manufacturing, testing, and fielding to verify the benefits and completeness of the capability for its intended users.

## About DETEC

DETEC is funded by the Department of Defense Test Resource Management Center's Central Test and Evaluation Investment Program (CTEIP) to address joint service DE weapon system T&E infrastructure needs and implement solutions to these identified needs. DETEC develops and fields capabilities to address high-priority shortfalls identified in the 2004 CTEIP-funded Tri-Service Study.

The DETEC SIC, Science Applications International Corporation (SAIC), implements the DETEC project by working with Government and industry teammates to develop functional specifications for certain DE T&E infrastructure capabilities. The SIC acquires these capabilities in competitive procurements and integrates the capabilities into the MRTFB to help meet the testing requirements for current and future high energy laser and high power microwave weapon systems. ■

*For further information about the HPM NBTS Capability, please contact Ms. Cyndi Mora, the HPM NBTS Project Manager, 505-830-6764 • email: Cyndi.M.Mora@saic.com or detec@saic.com Or contact Dr. J. Mark DelGrande, the HPM NBTS Capability Development Technical Lead, 505-830-7485 • email: J.Mark.Delgrande@saic.com*